PEDIATRIC BRADYCARDIA ALGORITHM

Assess ABCs

Secure Airway

Oxygen 90-100%

IV/IO NS KVO

Assess Vital Signs

Hemodynamically Stable? *(a)*

YES

- Poor perfusion
- Hypotension
- Respiratory difficulty

NO

VENTILATE!

- Observe
- Support ABCs
- Transport

Perform **chest compressions:**

If Pulse is less than 60 bpm in an infant or child.

Epinephrine

- IV/IO 0.01 mg/kg (1:10,000)
- ET 0.1 mg/kg (1:1,000), dilute 1-2 ml
- Repeat every 3-5 minutes (same dose) *(b) (c)*

Atropine

- IV/IO 0.02 mg/kg (ET dose 0.04 mg/kg)
- Minimum dose 0.1 mg
- Maximum single dose
  - Child 0.5 mg
  - Adolescent 1.0 mg
- Repeat Once 3-5 min

Medical Consultation
External Pacing

If Asystole develops, refer to asystole algorithm

(a) Hemodynamically unstable: altered mental status with hypo-perfusion evidenced by delayed capillary refill, pallor, peripheral cyanosis, or hypotension. Respiratory compromise may also be present. Hypotension being defined as 70 plus twice the child's age in years or less [70 + (2 x years) = systolic BP].

(b) INITIATE TRANSPORT

(c) Attempt 3 doses of Epinephrine prior to administration of Atropine. If Atropine is unsuccessful may return to Epinephrine administration every 3– 5 minutes.

Pediatric Cardiac Emergencies: Bradycardia

Note Well: *Cardiac dysrhythmias in otherwise healthy children are frequently the result of respiratory distress.*

I. All Provider Levels

1. Follow the General Patient Care guidelines in section A1.

2. If breathing is adequate, administer oxygen at 90-100% by face mask.

3. If airway cannot be maintained, begin ventilations with B-V-M and initiate advanced airway management using a combi-tube.

Note Well: *Do not use a combi-tube on a patient younger than 16 years of age or less than 5-feet tall.*

Note Well: *The EMT-I and EMT-P should use ET intubation.*

4. Determine if the patient is hemodynamically unstable.

Note Well: *Hemodynamic instability is defined as "altered mental status with hypoperfusion evidenced by delayed capillary refill, pallor, peripheral cyanosis, or hypotension." Respiratory compromise may be present. Hypotension is defined as a blood pressure of less than 70 plus twice the child's age in years.*
[70+(2 x Age)]=systolic BP

A. If the child is hemodynamically unstable, begin B-V-M ventilations with 100% oxygen.
   i. Begin chest compression if heart rate is less than 60 for an infant or child

I. All Provider Levels (continued)

B. If the child is hemodynamically stable then observe vital signs, support ABCs and transport to the nearest appropriate facility.

5. Call for ALS support. Initiate care and do not delay transport waiting for an ALS unit.

6. Establish an IV of normal saline.

> ***Note Well:*** *BLS Providers cannot start an IV on a patient less than eight years of age*

> ***Note Well:*** *An ALS unit must be en route or on scene.*

> ***Note Well:*** *If IV access cannot be readily established and the child is younger than 6 years of age then ALS Providers only may proceed with IO access. If the child is over 6 years of age, then contact Medical Control for IO access.*

II. Advanced Life Support Providers

1. Initiate cardiac monitoring.

2. Administer epinephrine using the most readily available route if hemodynamically unstable.

   A. Via ET tube: 1:1000 solution at 0.1mg/kg (maximum single dose 10mg).

> ***Note Well:*** *ET doses should be flushed with 3-5 cc of normal saline.*

II. Advanced Life Support Providers (continued)

B. Via IV or IO route or 1:10,000 solution at 0.01 mg/kg (maximum single dose 1.0 mg).

> ***Note Well:*** *IV doses should be flushed with 5-10 cc of normal saline.*

> ***Note Well:*** *Epinephrine may be repeated every 3 to 5 minutes at the same dose.*

3. If bradycardia persists after at least 3 doses of epinephrine, and the child continues to be hemodynamically unstable.

A. Administer atropine at 0.02 mg/kg via IV/IO, 0.04mg/kg via ET.
   i. The minimum dose required is 0.1 mg, with a maximum single dose is 0.5 mg for a child and 1.0-mg for an adolescent.
   ii. The dose may be repeated once after 3-5 minutes.
   iii. If Atropine is unsuccessful, return to Epinephrine administration every 3-5 minutes at same dose as above.

> ***Note Well:*** *ET doses should be flushed with 3-5 cc of normal saline. IV doses should be flushed with 5-10 cc of normal saline.*

4. Consult Medical Control to initiate pacing.

A. Medical Control will determine rate and voltage.

II. Advanced Life Support Providers (continued)

B. Consider administration of diazepam 0.2 mg/kg (maximum single dose 5.0 mg) IV for sedation before pacing *(Medical Control Option Only)*.

> ***Note Well:*** *In the event of a provider induced diazepam overdose, administer 0.01 mg/kg of flumazenil IV/IO over 30 seconds. Repeat as needed every minute. Maximum single dose is 0.2mg and maximum total dose is 1mg. (Medical Control Option Only)*
>
> ***Caution:*** *Flumazenil may induce seizures, particularly in patients with both tricyclic antidepressant overdose and benzodiazepine overdose.*

5. Follow up with a 12 lead EKG and call medical control for further direction. **DO NOT DELAY TRANSPORT!**

III. Transport Decision

1. Contact medical control for additional instructions.

2. Initiate transport to the nearest appropriate facility as soon as possible.

3. Perform a focused history and detailed physical examination en route to the hospital.

4. Reassess the patient at least every 3-5 minutes or as frequently as necessary and possible.

IV. The Following Options are Available by Medical Control Only

1. Transcutaneous Cardiac Pacing.

2. Diazepam, 0.2 mg/kg to a maximum single dose of 5.0 mg, IV for sedation.

3. Flumazenil, 0.01 mg/kg to a maximum single dose of 0.2mg and maximum total dose of 1mg to counteract provider induced diazepam overdose.

4. IO access for patients greater than 6 years of age.

This protocol was developed and revised by Children's National Medical Center, Center for Prehospital Pediatrics, Division of Emergency Medicine and Trauma Services, Washington, D.C.